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EXAMINER

MIYOSHI, JESSE Y

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/562,655 | Applicant(s) HAMANAKA ET AL. | |
| | Examiner JESSE Y. MIYOSHI | Art Unit 2811 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 23-37 is/are pending in the application.
- 4a) Of the above claim(s) 4, 10, 17-20, 27-30, 36 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9, 11-16, 21-26 and 31-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/8/2010, 3/17/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 3, 5-7, 9 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 9 are indefinite where it recites at lines 5-6 “each center of the spherical lenses being...” since it is unclear whether “the spherical lenses” are the same as or different from “plural parts of spherical lens” as recited in claim 2 or from “four parts of spherical lens” as recited in line 5 of claim 3.

Claims 3 and 9 are indefinite where it recites at line 7 “three parts of cylindrical lens” since it is unclear whether they are the same as or different from “plural parts of cylindrical lens” as recited in claim 2.

Claims 3 and 9 are indefinite where it recites at line 7 “having an axis parallel with the segment” because it is unclear which segment has a lens’ axis parallel to it or whether all three parts of the cylindrical lens is parallel with a single segment.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

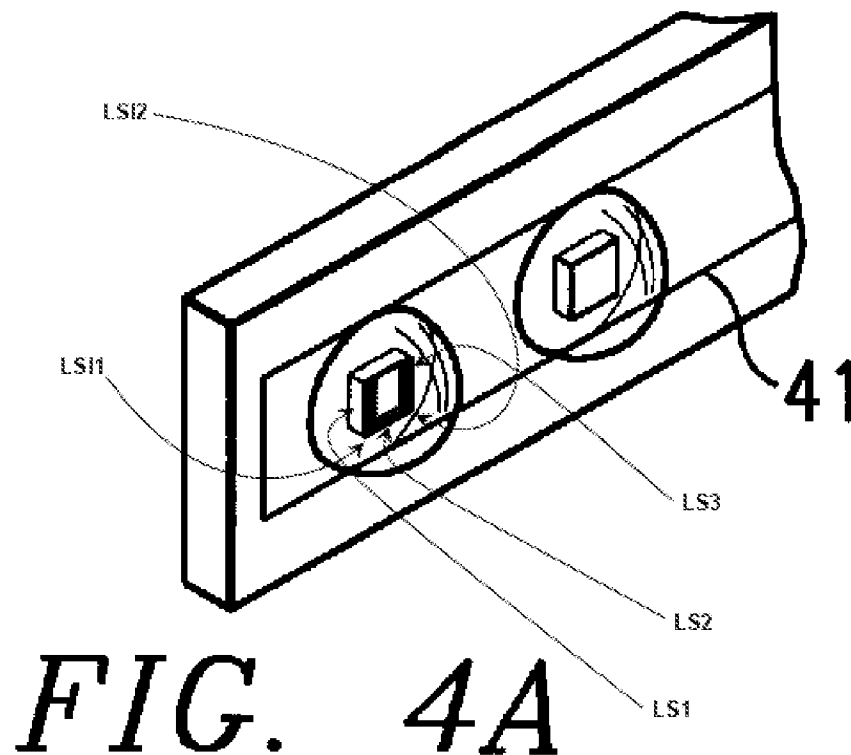
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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 8, 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Bohn (U.S. 6,188,527).

Re claim 8: Bohn teaches (e.g. figures 2 and 4A) a lens-attached light emitting element comprising: a light-emitting element (**13**) having a light-emitting area (upper surface of **13** that emits light **21**; hereinafter referred to as "**LEA**"), the light-emitting area (**LEA**) having a shape including a plurality of line segments (**LEA** is made up of a plurality of line segments, a few have been bolded in labeled figure 4A below as **LS1**, **LS2**, **LS3**) and one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**); and a composite lens (**11**) provided on the light-emitting element (**13**); wherein the composite lens (**11**) consists of a cylindrical portion (a sliver of the middle part of lens **11** is cylindrical; hereinafter "**CL**") disposed on each of the line segments (**LS1**, **LS2**, **LS3**) of the light-emitting area (**LEA**) and a spherical portion (the two opposing sides of the cylindrical portion of lens **11** are spherical; hereinafter "**SL**") disposed on each of the one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**) of the light-emitting area (**LEA**).

Claimed is "the light emitting area having a shape including a plurality of line segments and one or more intersections of line segments". Since the placement and orientation of "line segments" are not claimed, they can be arbitrarily chosen. In the instant rejection, line segments have been chosen by Examiner and can be seen below in the labeled figure 4A as LS1, LS2 and LS3.



Re claim 11: Bohn teaches the lens-attached light-emitting element, wherein the composite lens (11) is made of resin (epoxy, urethane, or acrylic; e.g. column 3, line 66).

Re claim 12: Bohn teaches a lens-attached light-emitting element array (see figure 4A), comprising a plurality of lens-attached light-emitting elements (11, 13) arranged in a straight line, wherein the lens-attached light-emitting element being recited in claim 1 or 8.

Re claim 13: Bohn teaches the lens-attached light-emitting element array (figure 4A of Bohn) according to claim 12, wherein the light-emitting element is a light-emitting diode (13).

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Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohn in view of Chiu et al. (U.S. PGPub 2001/0010449; hereinafter "Chiu").

Re claim 1: Bohn teaches (e.g. figures 2 and 4A) a lens-attached light-emitting element comprising: a light-emitting element (**13**) having a light-emitting area (upper surface of **13** that emits light **21**; hereinafter referred to as "**LEA**") on a semiconductor substrate (the material LED **13** is made of), the light-emitting area (**LEA**) having a shape including a plurality of line segments (**LEA** is made up of a plurality of line segments, a few have been bolded in labeled figure 4A above as **LS1**, **LS2**, **LS3**) and one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**); and a lens (**11**) formed on the surface of the light-emitting element (**13**) wherein the lens comprises a cylindrical portion (a sliver of the middle part of lens **11** is cylindrical; hereinafter "**CL**") disposed on each of the line segments (**LS1**, **LS2**, **LS3**) of the light-emitting area (**LEA**) and a spherical portion (the two opposing sides of the cylindrical portion of lens **11** are spherical; hereinafter "**SL**") disposed on each of the one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**) of the light-emitting area (**LEA**).

Bohn is silent as to an antireflection film covering the light-emitting area; and the lens formed on the surface of the antireflection film on the light-emitting element.

Chiu teaches an antireflection film (**326**) covering the light-emitting area (**322**); and the lens (**320**) formed on the surface of the antireflection film (**326**) on the light-emitting element (device of figure 3 of Chiu).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the antireflective coating of Chiu in the device of Bohn in order to increase the output efficiency.

The combination is motivated by the teachings of Chiu who points out the advantages of using the antireflective coating.

For example, Chiu teaches at paragraph 10 that using an antireflective coating can increase output efficiency of the light emitting device.

Claimed is “the light emitting area having a shape including a plurality of line segments and one or more intersections of line segments”. Since the placement and orientation of “line segments” are not claimed, they can be arbitrarily chosen. In the instant rejection, line segments have been chosen by Examiner and can be seen above in the labeled figure 4A as LS1, LS2 and LS3.

Re claim 2: Bohn teaches the lens (**11**) is a composite lens consisting of adjacently arranged plural parts of spherical lens (**SL**) and plural parts of cylindrical lens (**CL**).

Re claim 5: Bohn teaches the lens-attached light-emitting element, wherein the composite lens is made of resin (epoxy, urethane, or acrylic; e.g. column 3, line 66).

Re claim 6: Bohn in view of Chiu teaches the lens-attached light-emitting element, wherein the antireflection film (**326** of Chiu) is one-layer film, and the refractive

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index thereof has an intermediate value between that of the light-emitting area and that of the resin (**320** of Chiu) forming the composite lens.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohn in view of Chiu, as applied to claim 6, and further in view of Abbas (U.S. 4,644,342).

Re claim 7: Bohn in view of Chiu teaches substantially the entire claimed structure of claim 6 except explicitly teaching the antireflection film consists of silicon nitride.

Abbas teaches the antireflection film consists of silicon nitride (it is known for silicon nitride to be used as an antireflection layer, as evidenced by, see column 4, line 37)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the antireflection layer of Abbas in the device of Bohn in view of Chiu in order to use a known material that is readily available for an antireflection layer, making for simpler manufacture.

8. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohn in view of Tanioka et al. (U.S. 6,002,420; hereinafter "Tanioka").

Re claim 14: Bohn teaches substantially the entire claimed structure of claim 12 except explicitly teaching the light-emitting element is a light-emitting thyristor.

Tanioka teaches where the light-emitting element (array of self-scanning LED chips; **30-1**) is a light-emitting thyristor (light emitting device is a light emitting thyristor; see claim 10 of Tanioka).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the light-emitting thyristor of Tanioka in the device of Bohn in order to enable the device to have an additional function of scanning and image recording.

Re claim 15: Bohn modified by Tanioka teaches a self-scanning light-emitting element array (array of self-scanning LED chips; **30-1** of Tanioka), comprising a lens-attached light-emitting element array recited in claim 14.

9. Claims 16, 24, 26, 31, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins et al. (U.S. 5,711,890; hereinafter "Hawkins") in view of Bohn.

Re claim 16: Hawkins teaches (e.g. figures 4A-E) a method for manufacturing a lens-attached light-emitting element, comprising the steps of: (a) preparing a light-emitting element array substrate ; (b) preparing a glass substrate (**100**); (c) forming a etching stopper film (**110**) on the glass substrate (**100**); (d) forming an opening array (**114**) in the etching stopper film (**110**); (e) forming an array of recesses (**120a**) in the glass substrate (**100**) under the opening array (**114**) by wet etching (wet etch, e.g. column 5, line 54); (f) fabricating a mold by removing the etching stopper film (**110**) on the array of recesses (**120a**); (g) coating a resin (**130**) on the surface of at least one of the recesses (**120a**) of the mold and the light-emitting element array substrate.

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Hawkins does not teach each recess having a shape including a plurality of line segments and one or more intersections of line segments, each recess including a cylindrical concavity disposed on each of the line segments of the recess and a spherical concavity disposed on each of the one or more intersections of line segments of the recess; and the resin is a photo-curing resin (h) contacting the mold and the light emitting element array substrate to each other with sandwiching the photo-curing resin therebetween and pressing to each other develop the photo-curing resin therebetween; (i) irradiating light to the photo-curing resin from the side of the mold to cure the photo-curing resin at the portion where the etching stopper film is previously removed; (j) separating the mold from the light-emitting element array substrate; and (k) removing the uncured photo-curing resin on the light emitting element array substrate by cleaning.

Bohn teaches each recess (**120a** of Hawkins having the shape of lens **11** of Bohn; hereinafter "**LR**") having a shape (shape of mold of lens **11** of figure 4A of Bohn) including a plurality of line segments (the recess has a shape which is made up of a plurality of line segments, these line segments can be similar as those labeled figure 4A above as **LS1**, **LS2**, **LS3**) and one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**), each recess (**LR**) including a cylindrical concavity (a sliver of the middle part of lens **11** is cylindrical; hereinafter "**CL**") disposed on each of the line segments (**LS1**, **LS2**, **LS3**) of the recess (**LR**) and a spherical concavity (the two opposing sides of the cylindrical portion of lens **11** are spherical; hereinafter "**SL**") disposed on each of the one or more intersections (**LSI1**, **LSI2**) of line segments (**LS1**, **LS2**, **LS3**) of the recess (**LR**); and the resin is a photo-curing resin (lens cured by UV,

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epoxy; e.g. column 3, line 29 and 66) (h) contacting the mold and the light emitting element array substrate to each other with sandwiching the photo-curing resin (epoxy) therebetween and pressing to each other develop the photo-curing resin therebetween (lens mold pressed onto material of lens; e.g. column 4, line 26); (i) irradiating light to the photo-curing resin from the side of the mold to cure the photo-curing resin at the portion where the etching stopper film is previously removed (lens must be cured; e.g. column 3, line 38); (j) separating the mold from the light-emitting element array substrate (molds are typically not included into the final product); and (k) removing the uncured photo-curing resin on the light emitting element array substrate by cleaning (it is known in semiconductor processing for cleaning processes to be typically used to remove unwanted material).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the lens shape of Bohn in the method of Hawkins in order to result in a method that produces a lens form that can be used to provide better and more uniform lens shape for LEDs and other light emitting devices which more uniformly distributes light to a target area.

The combination is motivated by the teachings of Bohn who points out the advantages of using the lens made of photo-curing resin which distributes light more uniformly.

For example, Bohn teaches at column 1, lines 62-63 the advantages of using the lens form and shape and teaches at column 2, lines 24-25 that light is more uniformly distributed.

Claimed is “each recess having a shape including a plurality of line segments and one or more intersections of line segments”. Since the placement and orientation of “line segments” are not claimed, they can be arbitrarily chosen. In the instant rejection, line segments have been chosen by Examiner and can be seen above in the labeled figure 4A as LS1, LS2 and LS3.

Re claim 24: Hawkins modified by Bohn teaches the method for manufacturing a lens-attached light-emitting element, wherein the step (i) includes the step of making ultra violet or visible light to approximately collimated light and irradiating the collimated light approximately perpendicular to the glass substrate (as can be seen in figure 2 of Bohn, collimated light **21** is emitted).

Re claim 26: Hawkins modified by Bohn teaches the method for manufacturing a lens-attached light-emitting element, further comprising the step of cutting the light-emitting element array substrate after the step (k) (it is well-known for devices to be diced into individual devices).

Re claim 31: Hawkins modified by Bohn teaches the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate is a light-emitting diode array substrate (array of Bohn shown in figure 4A).

Re claim 35: Hawkins modified by Bohn teaches the lens (**11** of Bohn) is a composite lens consisting of adjacently arranged plural parts of spherical lens (**SL**) and plural parts of cylindrical lens (**CL**).

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10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins modified by Bohn as applied to claim 16 above, and further in view of Mesquida.

Re claim 21: Hawkins modified by Bohn teaches substantially the entire claimed structure of claim 16, except explicitly stating the method for manufacturing a lens-attached light-emitting element, wherein the shape of each opening of the opening array is approximate U-shape.

Mesquida teaches the method (e.g. figure 7) for manufacturing a lens-attached light-emitting element, wherein the shape of each opening of the opening array is approximate U-shape (in order to obtain the circular U shape, it would be obvious to make the opening of the opening array a U shape).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Mesquida in the method of Hawkins modified by Bohn in order to create a device having great compactness of integration (see column 7, line 45 of Mesquida).

11. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins modified by Bohn as applied to claim 16 above, and further in view of Scifres et al. (U.S. 3,954,534; hereinafter "Scifres").

Re claim 23: Hawkins modified by Bohn teaches substantially the entire method of claim 16, except explicitly stating the method for manufacturing a lens-attached light-emitting element, further comprising the step of coating a mold releasing agent on the surface of the recess array after the step (f).

Scifres teaches the method for manufacturing a lens-attached light-emitting element, further comprising the step of coating a mold releasing agent (5) on the surface of the recess array after the step (f).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Scifres in the method of Hawkins modified by Bohn in order to ensure a separation between mold and molded material (see column 3, line 18 of Scifres).

12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins modified by Bohn as applied to claim 16 above, and further in view of Beauvais et al. (U.S. 6,514,877; hereinafter "Beauvais").

Re claim 25: Hawkins modified by Bohn teaches substantially the entire claimed method of claim 16, except explicitly stating the method for manufacturing a lens-attached light-emitting element, wherein the etching stopper film is a Cr film, and the glass substrate is wet etched by a hydrofluoric acid based etchant.

Beauvais teaches the method, wherein the etching stopper film is a Cr film (chromium etch stop; e.g. column 5, line 6), and the glass substrate is wet etched by a hydrofluoric acid based etchant (HF etch; e.g. column 4, line 50).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Beauvais in the method of Hawkins modified by Bohn in order to simplify manufacture by using readily available materials.

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13. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins modified by Bohn as applied to claim 16 above, and further in view of Tanioka.

Re claim 32: Hawkins modified by Bohn teaches substantially the entire claimed method of claim 16 except explicitly stating the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate is a light-emitting thyristor array substrate.

Tanioka teaches the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate (array of self-scanning LED chips; **30-1**) is a light-emitting thyristor array substrate (light emitting device is a light emitting thyristor; see claim 10 of Tanioka).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the light-emitting thyristor of Tanioka in the method of Hawkins modified by Bohn in order to enable the manufacture of a device having an additional function of scanning and image recording.

Re claim 33: Hawkins modified by Bohn and Tanioka teaches the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate is a self- scanning light-emitting element array substrate (array of self-scanning LED chips; **30-1**).

14. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawkins modified by Bohn as applied to claim 16 above, and further in view of Chiu.

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Re claim 34: Hawkins modified by Bohn teaches substantially the entire claimed method of claim 16 except explicitly stating the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate includes an antireflection film covering the light-emitting area of each light-emitting element.

Chiu teaches the method for manufacturing a lens-attached light-emitting element, wherein the light-emitting element array substrate includes an antireflection film **(326)** covering the light-emitting area **(322)** of each light-emitting element.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the antireflective coating of Chiu into the teachings of Hawkins modified by Bohn in order to increase the output efficiency (see paragraph 10 of Chiu).

Response to Arguments

15. Applicant's arguments with respect to claim 1-3, 5-, 11-16, 21-26, 31-35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Examiner's note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSE Y. MIYOSHI whose telephone number is (571)270-1629. The examiner can normally be reached on M-F 7:30AM-5:00PM EST. Alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on (571) 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JYM

/Ori Nadav/

Primary Examiner, Art Unit 2811